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Effect of Water Saving Irrigation, Tillage and Residue on Yield and Water Productivity of Rice in the Khorezm Region of Uzbekistan

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Abstract

Water management is the most important issue constraining and threatening the productivity and sustainability of rice production in irrigated drylands of Uzbekistan. In conventional system, farmers in Uzbekistan used to maintain 15–20 cm standing water throughout the rice growing season which involves application of more than 60,000 m³ water per hectare. Water efficient conservation agriculture technologies like aerobic rice with optimum residue management and reduced tillage can increase water productivity and use efficiency. Thus, an experiment was conducted in Khorezm region of Uzbekistan during 2008–2009 for improved understanding of rice yield, water productivity and water saving potentiality of direct seeded aerobic rice. In this experiment, three tillage systems (permanent bed planting, zero tillage flat and conventional methods) with three levels (25, 50 and 100 %) of standing residue retention of previous wheat crop and two methods of irrigation (intermittent irrigation and continuous flood irrigation as farmers practice) were evaluated. In 2008, the beds were freshly prepared while after that it was kept permanently untilled. Rice variety (Nukus-2) released and adopted for conventional flood irrigated system was used for this study. In the years, leaf area index, aboveground biomass, harvest index and grain yield was significantly higher in conventional method of irrigation and cultivation than under permanent beds and zero tilled flats in all levels of residues. There was yield penalty of 28 and 33 % in 2008 and 45 and 43 % in 2009 under permanent beds and zero tilled flats, respectively. But conventional rice utilised significantly higher *i.e.* 66 909 and 59 058 m³ ha⁻¹ water, respectively in 2008 and 2009. While beds and zero tilled flats utilised less than one third of this amount. In both the years, water productivity was significantly higher in aerobic rice than under conventional. Higher height of standing residue provided shading effect to rice crop during the early growth stage resulting into less partitioning and less harvest index. Under the diminishing water supply, aerobic rice can be promising alternatives for this region provided the suitable machinery for the proper planting, nitrogen fertiliser application and residue management, and suitable aerobic rice variety.

Keywords: Aerobic rice, bed planting, conservation agriculture, direct seeded rice, water productivity